



U.S. DOE Zero Energy Ready Home Program Multifamily National Program Version 2, Rater Checklist DRAFT

Raters are reminded that these checklist items must be completed in addition to the items required by ENERGY STAR Multifamily New Construction Version 1.2 and Indoor airPLUS. Overlapping requirements are not repeated in this checklist.¹

Home Address:		City:	State:	Permit Date:		
1. Partnership Status				Must Correct	Rater ² Verified	Exception or Alternate Used ³ (Enter End Note #)
1.1 Rater has verified that builder is a registered DOE ZERH Builder Partner and identified the builder's Partner ID. ⁴						
2. ENERGY STAR Multifamily New Construction Baseline						
2.1 Unit is certified under ENERGY STAR Multifamily New Construction, Version 1.2. ⁵						
3. Building Envelope						
3.1a ERI and ASHRAE paths only: ceiling, wall, floor, and slab insulation for dwelling units meet or exceed 2021 IECC – Residential chapter or Commercial Group R levels. ⁶						
3.1b Prescriptive path only: ceiling, wall, floor, and slab insulation for dwelling units meet ZERH MF V2 Target Dwelling Design insulation levels.						
3.2 Windows in dwelling units meet high performance requirements based on climate zone. ⁷						
4. Duct System						
4.1 All heating and cooling distribution ducts and heating and cooling air-handling equipment serving dwelling units are located within the thermal and air barrier boundary. ⁸						
5. HVAC System⁹						
Track A	5a.1 For Prescriptive path projects: blower fan volumetric airflow is Grade I per ANSI/RESNET/ACCA 310.					
	5a.2 For Prescriptive path projects: blower fan watt draw is Grade I per ANSI/RESNET/ACCA 310.					
Track B	5b.1 For Prescriptive path projects: - Install a heat pump water heater OR - Achieve dwelling unit infiltration ≤ 0.20 CFM50/sf					
6. Water Heating Efficiency						
6.1 WaterSense labeled fixtures for dwelling unit showerheads, bath faucets, and aerators.						
6.2 Hot water delivery systems meet stored volume criteria. ¹⁰						
6.3 In-dwelling unit recirculation systems use on-demand controls. ¹¹						
6.4 Recirculating central hot water distribution systems meet pipe insulation thickness criteria. ¹²						
7. Lighting & Appliances						



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7.1 All builder-supplied and builder-installed in-dwelling refrigerators, ¹³ dishwashers, clothes washers, and clothes dryers are ENERGY STAR qualified. ¹⁴			
7.2 100% of builder-installed lighting fixtures and lamps (bulbs) provided are LEDs. ¹⁵			
7.3 All installed bathroom ventilation and ceiling fans are ENERGY STAR qualified. ¹⁶			
8. Indoor Air Quality			
7.4 Certified under EPA Indoor airPLUS. ¹⁷			
8.2 Energy efficient balanced ventilation (HRV or ERV) is provided in Climate Zones 6 – 8. ¹⁸			
9. Renewable Ready			
9.1 Provisions of the DOE ZERH Program, Multifamily National Program Version 2, PV-Ready Checklist are completed.			
10. Electric Vehicle Ready			
10.1 Provisions of the DOE ZERH Program, Multifamily National Program Version 2, EV-Ready Checklist are completed.			
11. Heat Pump Water Heater Ready			
11.1 Dwelling units with in-unit water heaters meet minimum electric and space requirements. ¹⁹			
11.2 Dwelling units with in-unit water heaters have a condensate drain installed within three feet of existing water heater. ²⁰			
12. Heat Pump Space Heating Ready			
12.1 For units with in-unit combustion space heaters, individual branch circuit outlet is installed or conduit is installed to facilitate future wiring for a heat pump installation. Circuit or conduit labeled as "For future heat pump." ²¹			
13. Energy Efficiency Threshold (if using ERI path)			
13.1 Dwelling unit's ERI value ≤ DOE ZERH Target Dwelling ERI			



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Endnotes:

The following endnotes are intended to relate the same exemptions and clarifications as noted in the ZERH MF V2 National Program Requirements. However, if there are any inconsistencies the endnotes in the National Program Requirements shall take precedence.

¹ This Checklist applies to all dwelling units, sleeping units, common spaces, and garages (open or enclosed) in the building being certified, and where specified, parking lots. These requirements apply to all compliance Paths, unless otherwise specified. These requirements do not apply to parking garages or lots where the cost of the energy use of the parking garage or lot is not the responsibility of the Builder/Developer, Building Owner or Property Manager. This Checklist does not apply to commercial or retail spaces. This Checklist does not apply to common spaces that are located in buildings on the property without any dwelling or sleeping units. A 'sleeping unit' as defined by ANSI / RESNET / ICC 301, is a room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Where the term 'dwelling unit' is used in this Checklist, the requirement is also required of 'sleeping' units. The term 'building' refers to a structure that encompasses dwelling/sleeping units and (if present) common spaces, sharing one or more of the following attributes: a common street address, a common entrance or exit, central/shared mechanical systems, or structurally interdependent wall or roof systems. Attached structures such as townhouses and 4-story two-unit structures (commonly referred to as "2-over-2s") may be considered separate buildings if they are divided by a vertical fire separation wall from the foundation to the roof sheathing and share none of the other attributes listed above. A skyway or a breezeway that connects two structures is not considered a common entrance or exit.

² The Rater is defined as the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater or Approved Inspector, as defined by ANSI / RESNET / ICC Standard 301, or an equivalent designation as determined by a DOE-recognized Home Certification Organization for ZERH (HCO for ZERH) or Multifamily Review Organization for ZERH (MRO for ZERH). All Raters for DOE ZERH projects must successfully complete a DOE ZERH orientation course. The Rater shall also have a signed partnership agreement in place with the DOE ZERH program.

³ If an exception for a program requirement or an alternate compliance method is used, enter the number of the corresponding End Note from this document that lists the exception or alternate.

⁴ The DOE ZERH Partner ID number for the builder may be obtained from the builder or found on the [Partner Locator tool](#) on the DOE ZERH program website.

⁵ DOE Zero Energy Ready Home Multifamily Version 2 requires compliance with ESMFNC V1.2, including in states where ESMFNC V1.1 (or an earlier version) is effective.

⁶ Projects may reference either IECC Residential or Commercial (Group R), but all building components within each item on the ZERH MF V2 National Rater Field checklist must reference the same standard (whether it be residential or commercial).

Building envelope assemblies, including exterior walls and unvented attic assemblies (where used), shall comply with the relevant vapor retarder provisions of the 2021 International Residential Code (IRC).

The total building envelope UA shall be less than or equal to the UA value that results from multiplying the U factors in the 2021 International Energy Conservation Code (IECC) – Table R402.1.2 (when using the Residential chapter) or Table C402.1.4 (when using the Group R values from the Commercial chapter) by the same assembly areas as the dwelling unit being certified. The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method. The performance of components (i.e.,



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fenestration, ceilings, walls, floors, slabs) can be traded off using the UA approach. However, note that the ZERH Mandatory window provisions (Exhibit 1) and Items 1.5, 1.6, and 3.1 through 3.7 of the ESMFNC National Rater Field Checklist must be met regardless of the UA tradeoffs calculated.

For jurisdictions designated by a code official as having Very Heavy Termite Infestation, the slab edge insulation value and depth shall be adjusted in the UA calculation. The code-required insulation level and depth shall be set to the insulation level and depth found in the Rated Dwelling Unit for the purpose of determining compliance with this ZERH requirement.

Any slab edge insulation allowances permitted by the most recent version and revision of the ESMFNC program are permitted. A list of currently exempted details is available at www.energystar.gov/slabeledge. Note that projects using these exempted details must still achieve the Target ERI and the total building envelope UA requirement, which assume the use of slab edge insulation per the 2021 IECC prescriptive values.

⁷ Windows shall meet the performance criteria below based on climate zone:

Window Specs Required for DOE Zero Energy Ready Home Projects	IECC CZ 1-2		IECC CZ 3,4A, 4B		IECC CZ 4C, 5 (SHGC values listed below may be paired with the U-value in the same row)		IECC CZ 6-8	
	U-Value	SHGC	U-value	SHGC	U-Value	SHGC	U-Value	SHGC
	≤ 0.40	≤ 0.23	[CZ 3] ≤ 0.30 [CZ 4] ≤ 0.30	[CZ 3] ≤ 0.25 [CZ 4] ≤ 0.40	≤ 0.27 = 0.28 = 0.29 = 0.30	Any ≥ 0.32 ≥ 0.37 ≥ 0.42	≤ 0.25	Any

If no NFRC rating is noted on the window or in product literature (e.g., for site-built fenestration), select the U factor and SHGC value from Tables 4 and 10, respectively, in 2013 ASHRAE Fundamentals, Chapter 15. Select the highest U-factor and SHGC value among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating) to determine the rating of the unrated fenestration. This rating must comply with ZERH window specifications, above.

The following exceptions to the ZERH Window performance criteria apply:

- An area-weighted average of fenestration products (per dwelling unit) shall be permitted to satisfy the U-factor requirements;
- An area-weighted average of fenestration products ≥ 50% glazed (per dwelling unit) shall be permitted to satisfy the SHGC requirements;
- 15 square feet of glazed fenestration per dwelling unit shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above;
- One side-hinged opaque door assembly up to 24 square feet in area shall be exempt from the U-factor requirements and shall be excluded from area-weighted averages calculated using a) and b), above;
- Fenestration utilized as part of a passive solar design shall be exempt from the U-factor and SHGC requirements and shall be excluded from area-weighted averages calculated using a) and b), above. Exempt windows shall be facing within 45 degrees of true South and directly coupled to thermal storage mass that has a heat capacity > 20 btu / ft³·°F and provided in a ratio of at least 3 sq. ft. per sq. ft. of South facing fenestration. Generally, thermal mass materials will be at least 2 in. thick.
- For project sites located at an elevation ≥ 5,000 feet above sea level and located in Climate Zones 5 – 8, windows with a maximum U factor of 0.30 (with any SHGC) may be used to satisfy this program requirement. For project sites located at an elevation ≥ 8,000 feet above sea level and located in Climate



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Zones 5 – 8, windows with a maximum U factor of 0.32 (with any SHGC) may be used to satisfy this program requirement.

- g. Structural dwelling unit windows and doors that are classified as “Class AW” under the North American Fenestration Standard. Class AW windows must instead meet the U and SHGC values listed in Exhibit 2 of the ZERH MF V2 National Program Requirements.

⁸ Exceptions and alternative compliance paths to locating 100% of forced-air ducts serving dwelling units within the building’s thermal and air barrier boundary are:

- a. Up to 10 ft. of total duct length is permitted to be outside of the thermal and air barrier boundary.
- b. Ducts (but not air handlers) may be located in a vented attic if minimum R-8 duct insulation is used, duct leakage to outdoors is measured ≤ 3 CFM25 per 100ft² of conditioned floor area, and:
 - i. In Moist (A) climate zones (per 2021 IECC Table R301.1), an additional 1.5 in. (min.) of closed-cell spray foam encapsulates the ducts and ductwork is buried under 2 in. (min.) of blown-in insulation; OR
 - ii. In Dry (B) and Marine (C) climate zones (per 2021 IECC Table R301.1, ductwork is buried under at least 3.5 in. of blown-in insulation.
- c. Systems which meet the criteria for “Ducts Located in Conditioned Space” as defined by the 2021 IECC Section R403.3.2.
- d. Jump ducts which do not directly deliver conditioned air from the heating/cooling equipment may be located in attics if all joints, including boot-to-drywall, are air sealed and the jump duct is fully buried under the attic insulation.
- e. Ducts and air-handling equipment may be located within an uninsulated and unvented crawl space or basement when the applicable dehumidification requirements of the Indoor airPLUS program are met.
- f. Ducts and air-handling equipment associated with dedicated outdoor air systems (DOAS), which may also provide supplemental heating and cooling, are permitted to be outside of the building’s thermal and air barrier boundary.
- g. This provision does not apply to equipment or ductwork that only provides ventilation, including make-up air systems.

⁹ Any project may choose to follow Track B for common spaces, even if Track A has been used for dwelling units. Systems eligible for Track A include all systems eligible for Track A under ENERGY STAR Multifamily New Construction, Version 1.2.

¹⁰ Hot water delivery systems meet the following efficiency requirements:

To minimize water wasted while waiting for hot water and water heating energy, the hot water distribution system shall store no more than 1.2 gallons (4.5 liters) of water in any piping/manifold between the hot water source and any hot water fixture. This provision applies to in-dwelling unit plumbing systems and central hot water distribution systems. System options include manifold-fed systems; structured plumbing systems; core plumbing layouts, and recirculation systems.

To verify that the distribution system stores no more than 1.2 gallons (4.5 liters), raters shall either use the Calculation method **or** the Field Verification method. In the Calculation method, the rater shall calculate the stored volume between the hot water source and the furthest fixture from the source using the piping or tubing inside diameter and the length of the piping/tubing. In the case of recirculation systems, the 1.2-gallon (4.5 liter) storage limit shall be measured from the point where the branch feeding the furthest fixture branches off the recirculation loop, to the fixture itself. An Excel-based tool is available on the DOE ZERH website for this calculation.



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Using the Field Verification method, no more than 1.4 gallons (5.3 liters) of water shall be collected from the hot water fixture before hot water is delivered. This accounts for any water stored in the fixture in addition to the 1.2-gallon limit on pipe storage. Only the fixture with the greatest stored volume between the fixture and the hot water source (or recirculation loop) needs to be tested. To field-verify that the system meets the 1.4-gallon (5.3 liter) limit, raters shall first initiate operation of recirculation systems, if present, and let such systems run for at least 40 seconds. Next, a bucket or flow measuring bag (pre-marked for 1.4 gallons) shall be placed under the hot water fixture. The hot water shall be turned on completely and a digital temperature sensor used to record the initial temperature of the water flow. Once the water reaches the pre-marked line at 1.4 gallons, the water shall be turned off and the ending temperature of the water flow (not the collection bucket) shall be recorded. The temperature of the water flow must increase by $\geq 10^{\circ}\text{F}$ in comparison to the final to the initial temperature reading.

- ¹¹ In-dwelling unit hot water recirculation systems meet the following requirements:
- Must be based on an occupant-controlled switch or an occupancy sensor, installed in each bathroom in the dwelling unit which is located beyond a 1.2 gallon stored-volume range from the water heater or central recirculation loop.
 - In-dwelling unit recirculation systems which operate based on “adaptive” scheduling, meaning that they “learn” the hot water demand profile in the dwelling unit and adapt their operation to anticipate this profile, are permitted at this time, and do not require the use of occupant-controlled switches or occupancy sensors.
 - In-dwelling unit recirculation systems that are activated based **solely** on a timer and/or temperature sensor are not eligible.

These provisions do not apply to recirculating central hot water distribution systems.

¹² For recirculating central hot water distribution systems, the following pipe insulation thickness levels must be met or exceeded. Additionally, pipe insulation shall cover the entire length of the recirculation loop to the extent possible.

Nominal Pipe or Tube Size (inches)	Insulation Thickness (inches)
< 1.5	1.5
≥ 1.5	2.0

¹³ Due to industry supply chain challenges, DOE is temporarily allowing the use of non-ENERGY STAR certified refrigerators for projects using the ERI and ASHRAE 90.1 compliance paths. Any project utilizing this temporary alternative must account for the non-ENERGY STAR certified refrigerator in the energy model and still achieve the required performance threshold. DOE advises partners that this alternative may be rescinded in a future program update.

¹⁴ Products in categories which are not covered by ENERGY STAR product criteria are exempt.

¹⁵ Up to 5% of lighting, for task or decorative lighting, may be exempt from this provision. The Target Home specification for lighting will remain at 100% regardless of whether this exemption is used. Projects following the prescriptive path may not use this 5% exemption.

¹⁶ This provision does not apply to H/ERVs that are used to provide exhaust ventilation for bathrooms.

¹⁷ Buildings permitted on or before 12/31/2024 must certify under the Indoor airPLUS Version 1 program requirements. For buildings permitted after 12/31/2024, DOE will consider a revision to these program requirements that specifies if an updated version of Indoor airPLUS must be used. See the Indoor airPLUS



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program site for information on program updates: <https://www.epa.gov/indoorairplus/indoor-airplus-program-documents>.

¹⁸ An in-unit HRV or ERV is required to provide whole-dwelling mechanical ventilation for dwelling units in Climate Zones 6 – 8 and must meet or exceed the following specifications: $\geq 65\%$ SRE (@ 32 °F) and ≥ 1.2 CFM/Watt. Alternatively, projects may utilize centralized H/ERVs serving multiple dwelling units.

¹⁹ Each dwelling unit with an in-unit water heater has an individual branch circuit outlet that is installed, energized, and terminates within 3 feet of each installed fossil fuel water heater, and a space located within the dwelling unit that is at least 3' x 3' wide and 7' high shall be available surrounding or within 3 feet of the installed fossil fuel water heater, to facilitate future heat pump water heater installation. The individual branch circuit shall have a rating not less than 240V/30A or 120V/20A. The 3' x 3' x 7' volume may contain the existing water heater. An exception to the requirement for the 3' x 3' x 7' space is provided when the installed water heater is an electric tankless system or a fossil fuel tankless water heater.

Dwelling units utilizing an electric water heater are exempt from this requirement.

²⁰ Drain is no more than two inches higher than the base of the installed water heater and allows draining without pump assistance. Drain is not required to be reserved exclusively for use with a future heat pump water heater.

²¹ If a branch circuit outlet is installed, it shall be in compliance with 2021 IRC Section E3702.11 based on heat pump space heating equipment sized in accordance with 2021 IECC R403.7 and shall terminate within three feet of each fossil fuel space heater. Alternatively, code-compliant wiring conduit to facilitate future wiring for a heat pump installation may be installed and shall terminate within three feet of each fossil fuel space heater.

Dwelling units utilizing in-unit electric heating systems as the primary heating for the dwelling unit are exempt from this requirement.